Annexure – I

Syllabus for B.Tech. III Semester

B.Tech - Civil Engineering

Scheme

Sr. No.	Course Code	Courses	L	T	P	Credit
1	CE3CO01	Engineering Surveying	3	0	2	4
2	CE3CO04	Building Planning and Drawing	3	0	2	4
3	CE3CO05	Construction Material & Techniques	3	0	2	4
4	CE3CO08	Fluid Mechanics	3	1	2	5
5	CE3ES10	Strength of Material	3	1	2	5
6	CE3EL07	Transportation Bridges &Tunnels	3	0	0	3
		Total	**18**	**2**	**10**	**25**
		Total Contact Hours	30			

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Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
CE3CO01	Engineering Surveying	3	0	2	4

UNIT-I: TRAVERSING

Traversing by theodolite, field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, omitted measurements, measurement EDM, Trigonometrical levelling. Linear Measurements: Methods, equipment's, Ranging, Chain Surveying, Field Work & Plotting, Obstacles in Chaining, area, volume Computation, types of scales.

UNIT-II: TACHOMETRY

Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring.

UNIT-III: CURVES

Curves: Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscate, vertical curves, setting out.

UNIT-IV: CONTROL SURVEY

Control Surveys: Reconaissance, Providing frame work of control points, triangulation principle and classification, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.

UNIT-V: AERIAL AND HYDROGRAPHIC SURVEY

Principles of photographic surveying: aerial photography, tilt and height distortions, Remote sensing, active & passive remote sensing, global positioning systems, GIS and applications in current context. Hydrographic Surveying: Soundings, methods of observations, computations and plotting.

Text Books:

1. T.P. Kanetkar, Surveying & Levelling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
5. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
6. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

Reference Books:

1. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
2. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London.

List of Practicals:-

1. Theodolite traversing
2. Profile levelling. contouring & cross sectioning
3. Determination of tachometric constants & uses of tachometer in various field works
4. Curve setting by different methods.
5. Building lay-out work
6. Theodolite surveying Measurement of horizontal angle
7. Theodolite surveying Measurement of vertical angle for determination of height of object.

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Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
CE3CO04	Building Planning and Drawing	3	0	2	4

UNIT I BUILDING ELEMENTS

Drawing of various building elements like types of footings and foundations – stepped, grillage, and pile foundation; sketches of various types of doors, windows, and ventilators, trusses, flooring, roofs etc.; Design and drawing of different type of stairs.

UNIT II BUILDING PLANNING AND ARCHITECTURAL ELEMENTS

Building classification as per the provisions of National Building Code; Residential Buildings, Recommendations according to building bye-laws: FAR, Setback, open area, number of stories, etc; Principles of planning; Elementary understanding of energy efficient buildings; Principles of architectural composition i.e. unity, balance, proportion, scale, rhythm, harmony, and contrast.

UNIT III BUILDING SERVICES

Introduction and overview of Building Services in bye-laws, like water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems, principles of internal & external drainage systems, principles of electrification of buildings, ventilation and lighting.

UNIT IV DRAWING OF BUILDING AND PERSPECTIVE DRAWING

Concept of line plan, sun diagram and working drawing. Design and preparation of detailed drawings of residential buildings and institutional buildings. Scaling of objects, orientation in detailed drawings. Introduction to the code of practice for building drawing: plan, elevation and section of different residential and institutional buildings (Indian Standard);
Elements of perspective drawing: one point, two point and three point perspectives. Introduction to drafting packages such as Auto-CAD.

UNIT V TOWN PLANNING

Concepts of master plan and regional plans, town planning legislation and municipal acts, planning of control development schemes, planning standards for different land use, allocation for commerce, industries, public amenities, open areas etc., planning standards for density distributions, density zones in India, provision for urban growth, growth models, estimating future needs, plan implementation, overview of sustainable development goals.

TEXT BOOKS

1. Malik & Meo; Building Design and Drawing
2. A Textbook of Perspective and Sciography/Shankar Mulik
3. Gurucharan Singh and Jagdish Singh, Building Planning, Designing and Scheduling, Standard Publishers Distributors.

REFERENCE BOOKS

1. Shah, Kale &Patki; Building Design and Drawing; TMH
2. S.C. Rangwala; Town Planning; Charotar Publishing.
3. Harold Reeve Sleeper; Building planning and design standards; Wiley, 1955.

LIST OF PRECTICALS

1. Drawing of various building components including doors, windows, lintels and arches stairs, foundations etc.
2. One drawing sheet each for services and interiors of buildings.
3. One drawing sheet containing detailed planning of one/two bed room residential building (common to all students)
4. One drawing sheet each of residential and institutional building (Individual drawings from each student).
5. Use of AutoCAD for preparation of drawings.

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Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
CE3CO05	Construction Material & Techniques	3	0	2	4

UNIT-I INTRODUCTION CLASSIFICATION

Properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, Types of Portland cement, hydration, setting and hardening process, special hydraulic cements, Admixtures, accelerators, and retarders, air-entraining agents, plasticizer and super-plasticizers. Aggregates: Shape and texture, strength, specific gravity, bulk-density and moisture content of aggregates, bulking of sand, sieve-analysis and grading curves. Higher strength concrete, fiber-reinforced concrete, ready mix concrete, Vacuum concrete, Shot-Crete, Guniting.

UNIT-II PROPERTIES OF FRESH AND HARDENED CONCRETE

Introduction, Workability, Testing of concrete, Factors affecting- Rheology of concrete, Compressive & Tensile strength, Stress and strain characteristics, Shrinkage and temperature effects. Creep of concrete, Permeability, durability, thermal properties & micro-cracking of concrete.

UNIT-III DESIGN OF CONCRETE MIX

Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhiand other Pozzolanic materials,design.Various provisions of IS code for sound concrete.

UNIT-IV MASONRY WORK

Dressing of stones masonry, material required for stone masonry, joints in stone masonry, classification of stone masonry, safe permissible load on stone masonry, tools used in stone masonry, appliances for lifting stones. Brick masonry: General, size and weight of brick, types of brick masonry, safe permissible load on brick masonry, tools used in brick masonry, bonds in brick masonry, bonds at connections, thickness of walls in brick masonry, supervision of the brick masonry, defects in brick masonry, cracking in brick masonry walls, comparison of brick work and stone work.

UNIT-V CONSTRUCTION EQUIPMENT

Selection of equipment, classifications, owning and operating cost of equipment, bulldozer, dumpers, trenchers, excavators, hauling, hoists, conveying, graders, piling hammers, pumps, compressors, rollers, clam shell

TEXT BOOKS

1. Gambhir ML; Concrete Technology – TMH
2. Sinha SN; Reinforced Concrete Technology; TMH
3. Properties of Concrete - A.M. Neville - Pearson Education
4. S.C. Rangwala; Engineering Materials

5. S.C rangwala; construction material
6. Sushil Kumar; Building Construction
7. B.C. Punmia; Building Construction

REFERENCES BOOKS

1. Varshney RS; Concrete Technology; Oxford& IBH publishing co.
2. New Building Materials Published by B.M.T.P.C., New Delhi
3. Hand books on Materials & Technology - Published by BMTPC & HUDCO

LIST OF PRACTICALS

1. Determination of Fineness and Specific Gravity of cement.
2. Determination of consistency of standard Cement Paste.
3. Determination of initial and Final Setting times of Cement.
4. Determination of Compressive Strength of Cement.
5. Determination of Fineness modulus of Coarse and Fine Aggregates.
6. Determination of percentage of voids, Bulk density, Specific Gravity of coarse and Fine Aggregates.
7. Workability Tests: Slump Cone Test, Compaction factor test, Vee-Bee consistometer Test.
8. Preparing and curing concrete specimens for tests & Determination of compressive strength of concrete cubes.
9. Study of stress - strain characteristics of concrete and tests for tensile strength of concrete.
10. Mix Design: IS Code method.

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Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
CE3CO08	Fluid Mechanics	3	1	2	5

UNIT-I FLUID PROPERTIES

Properties of Fluid- Mass, Density, Specific weight, Specific gravity, Specific volume, Vapour pressure, Compressibility, Elasticity, Surface Tension, Capillarity; Newton'slaw of viscosity, Classification of fluids, dynamic viscosity and kinematic viscosity, variation of viscosity with temperature; Fluid Statics- Measureent of pressure: pressure variation in a static fluid, PASCAL's law, Units and scale of measurement-Atmospheric pressure, Absolute pressure, Gauge pressure and vacuum pressure, Hydrostatic paradox. Piezometer, U-Tube manometer, single column manometer, U-Tube differential manometer, Inverted U-Tube differential manometer. Dimensianal Analysis: Buckingham pi theorem, Calculation of dimensionless numbers, similarity laws.

UNIT-II BUOYANCY AND FLOATATION

Buoyant force, buoyancy and center of buoyancy, Archimedies principle, Principle of Floatation. Metacenter and metacentric height, Equilibrium of floating and submerged bodies, Evaluation of metacentric height- theoretical and experimental method. Oscillation of floating body. Drag and Lift- Types of drag, drag on a sphere, cylinder, flat plate and airfoil. Development of lift on immersed bodies, magnus effect and circulation, lift characteristics of airfoils.

UNIT-III FLUID KINEMATICS

Fluid flow methods of analysis of fluid motion, Streamlines, Path lines, Streak lines, Stream Tubes. Types of fluid flow- steady and unsteady, uniform and non-uniform flow, laminar, transitional and turbulent flow reynolds number and reynold experiment, Rotational and irrotational flow, Subcrtical , critical and supercritical flow, compressible and incompressible flow, one , two and three dimensional circulation and vorticity, velocity potential and stream functions, flow net

UNIT-IV FLUID DYNAMICS

Concept of control mass and control volume, Reynolds transport theorem, conservation of mass, momentum equation, Euler's equation, Navier-Stokes equations. Derivation of Bernoulli's equation from Euler's equation and application of momentum and energy equations, energy and momentum correction factors. Measuring devices: Orifices, Nozzles, Mouth pieces, Orificemeter, Rotameter, Venturimeter, Weirs and Notches, Pitot tube.

UNIT-V FLOW THROUGH PIPES

Loss of head through pipes, Darcy-Wiesbach equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, pipes in parallel, concept of equivalent length, branching of pipes, siphon, power transmission through pipes, water hammer in pipes, three reservoir problems, Analysis of Pipe networks: Hardy Cross method.

TEXT BOOKS:-

1. Fluid Mechanics & Hydraulics Machine Modi & Seth , Standard Book House
2. Fluid Mechanics & Hydraulics Machine R K Bansal, Lakshmi Publications
3. Fluid Mechanics & Hydraulics Machine RK Rajput, S Chand Publications
4. Fluid Mechanics & Hydraulics Machine AK Jain Khanna Publisher

Reference Books:-

1. Garde R.J. and mirjagaokar A.G. "Engineering Fluid Mechanics" scitech publications (india) pvt. Ltd. Chennai 2003.
2. Fox W.R. MacDonald A.T. "Introduction to Fluid Mechanics" Wiley & Sons Inc. New York, 1998.
3. Asawa G.L. "Fluid Flow in Pipes and channels", CBS Publishers, New Delhi, 2008
4. Streeter V.L., Bedford K. and Wylie E.B., "Fluid Mechanics", McGraw Hill Book Componay Ltd., New York, 1998.

LIST OF PRACTICALS:-

1. To verify Bernoulli's Theorem.
2. Measurement of flow through Venturimeter, Orificemeter, Roatameter.
3. To study the impulse momentum factor by Impact Jet
4. To Determine metacentric height of a given vessel under (a) Unloaded condition (b) Loaded condition
5. To study Laminar Flow with the help of Reynold's number
6. To determine the frictional coefficient 'f' for the given fittings
7. To determine frictional factor 'f' for given pipes
8. To measure discharge rate with the help of pitot tube
9. To study the flow pattern in free and forced vortex flow with the help of vortex apparatus
10. To find the value of coefficient of contraction, coefficient of velocity and coefficient of dischargefor given; (a) Orifices (b) Mouthpieces

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Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
CE3ES10	Strength of Material	3	1	2	5

UNIT-I SIMPLE STRESS AND STRAINS

Stresses in compound bars, composite and tapering bars, Thermal stresses and strains, principle of superposition.

Complex Stress and Strains:-Two dimensional and three dimensional stress system, Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses.

UNIT-II SHEAR FORCE AND BENDING MOMENT

Introduction of shear force and bending moment; sign conventions, Types of load, beams, supports; Shear force and bending moment diagrams for simply supported, overhang and cantilever beams subjected to any combination of point loads, uniformly distributed load and point moment; Relationship between load, shear force and bending moment.

Deflection: Deflection of beams by Double Integration Method, Conjugate Beam Method, Macaulay's Method and Area Moment Method.

UNIT-III BENDING & SHEAR STRESSES:

Theory of simple bending, Concept of pure bending and bending Stress, Equation of bending, Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed load. Bending & shear stress distribution across a section in Beams.

UNIT-IV TORSION OF SHAFTS

Concept of pure torsion, Basic assumptions, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Combined Bending and Torsion.

Pressure Vessels:-Thin walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume.

UNIT-V COLUMNS AND STRUTS

Stability of Columns; buckling load of an axially loaded column with various end conditions; Euler's and Rankine's formula; Columns under eccentric load.

Introduction of Unsymmetrical Bending, Shear center and Theory of failure.

TEXT BOOK:-

1. Punmia B.C., Mechanics of Materials, Laxmi Publications (P) Ltd.
2. S.S Bhavikatti, Strength of Materials, Vikas Publisher, New Delhi
3. Rajput R. K., Strength of Materials, S. Chand.
4. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publications.
5. R. Subramaniam, Strength of Materials, Oxford University Press.
6. Sadhu Singh, Strength of Material, Khanna Publishers.
7. D.S Prakash Rao, Strength of Material, University Press, Hyderabad.
8. Debrath Nag, Strength of Material, Wiley.

9. Bansal R.K. Strength of Materials, Laxmi Publisher, New Delhi.
10. Chandramouli, Strength of Materials, PHI learning.
11. Dongre A.P., Strength of Materials, Scitech, Chennai.
12. Raj Puroshattam, Strength of Material, Pearsons.
13. J.M. Gere, .J. G. Barry Mechanics of Material, Cengage Learning.

REFERENCE BOOK:-

1. Jindal, Strength of Material, Pearsons.
2. Nash, W.A., Strength of Materials, McGraw hills, New Delhi.
3. Negi L. S, Strength of Materials, McGraw Hill Professional.
4. Stephen P. Timoshenko, Strength of Materials (Part 1) Krieger Pub Co.
5. Strength of materials, F.L. Singer and Pytel, HarperCollins College Div.

LIST OF PRACTICALS:-

1) To determine the flexural rigidity of beam and compared it with theoretical value.
2) Comparison of Euler's buckling load with theoretical value.
3) Determination of shear force of beam and comparison with the theoretical values.
4) Determination of bending moment of beam and comparison with the theoretical values.
5) To determine the deflection of Beam by the use of deflection-beam apparatus.
6) Study of Universal testing Machine.
7) To determine the reaction of beam.
8) To study the Mohr circle of stresses.
9) To understand the concept of unsymmetrical bending.
10) To determine the shear centre of a given section.

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Course Code	Course Name	Hours per Week			Total Credits
		L	T	P	
CE3EL07	Transportation Bridges & Tunnels	3	0	0	3

UNIT I INTRODUCTION:

History, Indian Railways, recent developments. Railway Track Gauge: Different gauges on Indian Railways, loading gauge, construction gauge, Problems caused by change of gauge. Alignment of Railway lines: Importance, Basic requirements of an ideal alignment, selection of a good alignment. Track and Track stresses: requirements Forces acting on Track, coning of wheels. Rails unctions, types of rails, Standard rail sections, Causes of creep, Effects of creep, Measures to reduce creep. Sleepers: types and comparison, requirement of a good sleeper, sleeper density. Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails. Fittings and fastening.

UNIT II GEOMETRIC DESIGN OF TRACK:

Necessity for geometric design, Details of geometric design of track, Design of Track, Gradients, Grade compensation on curves. Curves and Super elevation. Resistance to Traction:

Resistance to-friction, wave action, speed, track irregularity, wind, gradient, curvature, starting and accelerating. Stress in rails, sleepers, ballast and formation.

UNIT III POINTS AND CROSSINGS:

Important terms, track layouts and sketches of turn out, diamond crossing, gauntleted track, triangle, double junction, cross over-between two parallel tracks with intermediate straight length, scissors cross over, Single slip, Double slip, Gathering line. Railway Stations and yards:

Purpose, facilities required at railway stations. Requirements of station yard, Classification of Railway stations, Types of Yards, Signaling and interlocking: objectives of signaling, classification of signals, Interlocking.

Airport: Airport, Obstructions, Lightning & Traffic Control Zoning regulation approach area, approach surface-imaginary, conical, horizontal, Rotating beacon, boundary lights approach lights, runway and taxiway lighting etc.

UNIT IV BRIDGE SITE INVESTIGATION AND PLANNING:

Loading Standards &Component parts: Selection of site, alignment collection of bridge design data: Essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges. Design loads and forces: Impact factor, Indian loading standards for Railways Bridges and Highway Bridges. Bridge super structure and sub-structures: abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure. Bridge Foundations & Construction : Different types of foundation piles and wells, sinking of wells, coffer-dams. Choice of

bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams.

UNIT V TUNNELS:
Selection of route: Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts , Construction of tunnels: In soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation. Examples of existing important tunnels in India and abroad.

TEXT BOOK

1. Railway Track by K.F. Anita
2. Bridge Engineering – J.S. Alagia – Charotar Publication House, Anand
3. Railway, Bridges & Tunnels by Dr. S.C. Saxena
4. "Highway Engineering" S.K.Khanna & C.E.G.Justo, Nemchand & Bros.

REFERENCE BOOKS

1. A Text Book of Railway Engineering- S.C. Saxena and S. P. Arora- Dhanpat Rai & Sons, New Delhi
2. Principles of Railway Engineering- S.C. Rangwala, K.S. Rangwala and P.S. Rangwala- Charotar Publishing House, Anand
3. Principles and Practice of Bridge Engineering- S.P. Bindra- Dhanpat Rai & Sons, New Delhi
4. Tunnel Engineering- S.C. Saxena- Dhanpat Rai & Sons, New Delhi
5. Railway Engineering- Satish Chandra and M.M. Agrawal- Oxford University Press, New Delhi